Appendix A Index

Geotechnical Scoping Form

PROJECT INFORMATION		
File No.	PIN:	Date of Trip:
County:	Location:	
Rd/Route:	Local Name:	
Charge Code:	Track:	
Attendees:		

EXISTING BRIDGE INFORMATION		
Bridge Length:	Bridge Width:	
Superstructure Type:	Substructure Type:	
Begin Sta.:	End Sta.:	
Structure Number:	Crossing:	Posted Weight Limit:
Latitude:	Longitude:	

EXISTING SITE INFORMATION
Accessibility Issues:
Ground Cover:
Local Development (undeveloped, developed residential, developed commercial, developed industrial etc.):
Topography (level, flat, rolling, steep, hillside, valley, swamp, gully, etc.):
Traffic Control Necessary (Y/N):

HYDRAULICS INFORMATION		
Surface Soil:	Muck (Y/N):	Skew:
Exposed Rock (Y/N):	In Stream Bed (Y/N):	In Banks (Y/N):
Wetlands On-Site (Y/N):	Wetlands Adjacent (Y/N):	
Depth FG to Water:	Water Depth:	
Depth to Existing Ground:	Flow:	
Scour Condition at EB:	Scour Condition at IB:	

UTILITIES INFORMATION
Attached:
Above Ground/ Overhead:
Underground:

COMMENTS

*******Optional Diagram, Additional Boring Information on Back*******

Bridge Load Data Sheet

PROJECT INFORMATION			
File No.		Project No. (PIN):	
County:		Route:	
Description:			
Report Request By:		Date Requested:	

BRIDGE STRUCTURE INFORMATION			
Bridge Type:			
No. Spans /Lengths:		**Width / No. Lanes:**	
Bridge Category / Seismic OC:			
Seismic Performance Category (SPC):			
Seismic Site Class:			
Structural Design Method:	LRFD ☐	LFD ☐	

Proposed Foundations (foundation type, size, and number per bent)	
End Bent	
Interior Bent	

HYDRAULICS INFORMATION			
Design Scour	Contraction Scour (feet)	Local Scour (feet)	Total Scour (feet)
100 Yr			
500 Yr			

BRIDGE LOADS				
Location/Elev. of Applied Loads:	End Bent:		Int. Bent:	
Location/Elev. Est. Point of Fixity:	End Bent:		Int. Bent:	

End Bent Foundation Loads				
Strength Axial Loads (kips):	DL		DL + LL	

Interior Bent Foundation Loads						
(Strength I, II, III, IV, and V) Longitudinal Loads (Along the bridge or perpendicular to bent cap)						
Load Cases:	**Case 1FL ($P=P_{max}$)**		**Case 2FL ($V=V_{max}$)**		**Case 3FL ($M=M_{max}$)**	
P (axial - kips) =	DL+ LL	DL	DL+ LL	DL	DL+ LL	DL
V (shear - kips) =						
M (moment – ft-kip) =						
(Strength I, II, III, IV, and V) Transverse Loads (Transverse to the bridge or in direction bent cap)						
Load Cases:	Case 1FT ($P=P_{max}$)		Case 2FT ($V=V_{max}$)		Case 3FT ($M=M_{max}$)	
P (axial - kips) =	DL+ LL	DL	DL+ LL	DL	DL+ LL	DL
V (shear - kips) =						
M (moment – ft-kip) =						

End Bent Foundation Loads	
***Seismic Performance** (Required for SPC = B, C, D)*	
Extreme Event I	
Load Cases:	Maximum Axial Load ($P=P_{max}$)
P (axial - kips) =	

Interior Bent Foundation Loads	
***Seismic Performance** (Required for SPC = B, C, D)*	
Extreme Event I	
Load Cases:	Maximum Axial Load ($P=P_{max}$)
P (axial - kips) =	

Consultant Seismic Information Request

PROJECT INFORMATION			
File No.			**Project No. (PIN):**
County:	**RPG[1]:**		**Route:**
Description:			
Latitude (4 decimals): .			**Longitude (4 decimals):** .

SEISMIC REQUEST

The SCDOT Geotechnical Design Manual and Seismic Design Specifications for Highway Bridges, latest editions, provide detailed seismic design requirements for transportation structures. The RPG Geotechnical Design Section (GDS) will be generating seismic design information from, *SCENARIO_PC*, the seismic analysis software. The consultant is encouraged to review the software documentation, *Information on Analysis Software*, for assistance in completing this form. The RPG GDS will be providing the pseudo-spectral acceleration (PSA) oscillator response for frequencies 0.5, 1.0, 2.0, 3.3, 5.0, 6.7 and 13 Hz, for 5% critical damping and peak horizontal ground acceleration (PGA) at either the **B-C Boundary** (Geologically Realistic) or **Hard Rock** Outcrop for specific project locations within South Carolina. The Geologically Realistic option is for sites in the Coastal Plain with sediment thickness greater than 100 feet to firm sediment (V_s=2,500 feet per second (ft/s) or NEHRP B-C Boundary). Geologically Realistic conditions can also be encountered outside of the Coastal Plain where the sediment thickness is 100 feet or less above the basement rock and the V_s = 8,000 ft/s. The Hard Rock Outcrop option is for an outcrop of hard rock ($V_s \geq$ 11,500 ft/s). The Preconstruction Support – Geotechnical Design Section (PCS/GDS) has developed a map to assist in determining the site condition. South Carolina has been divided in two zones, Zone I – Physiographic Units Outside of the Coastal Plain and Zone II – Physiographic Units of the Coastal Plain. This information can be provided for the Safety Evaluation Earthquake (SEE) 3% probability of exceedance for 75-year exposure periods or for the Functional Evaluation Earthquake (FEE) 15% probability of exceedance for 75-year exposure periods. The consultant is reminded that all embankment structures are required to be designed for both the SEE and FEE. The consultant will use this information in developing the Acceleration Design Response Spectrum (ADRS) in accordance with the SCDOT Geotechnical Design Manual and Seismic Design Specifications for Highway Bridges. The RPG GDS can also provide the Time Series for use in performing a Site-Specific Response Analysis.

STRUCTURE SEISMIC INFORMATION

Bridge Category / Seismic OC:	
Seismic Performance Category (SPC):	
Seismic Site Class:	
Bridge Seismic Level of Design:	

Select Design Earthquake

SEE – 3% Probability of Exceedance in 75 years	☐
FEE – 15% Probability of Exceedance in 75 years	☐

Geologically Realistic ☐ **Hard Rock Basement Outcrop** ☐

Requestor Information

Requestor Name:	
Company Name:	
Phone Number:	( ) -
Email Address	
Request Date:	

Consultant Seismic Information Request

PROJECT INFORMATION	
File No.	**Project No. (PIN):**

TIME SERIES GENERATION REQUEST

Time Series information is required if a Site-Specific Response Analysis is to be conducted. The SCDOT Geotechnical Design Manual requires a Site-Specific Response Analysis for Seismic Site Class "F". Unscaled and Scaled time series will be generated for the **B-C Boundary** in Shake91 data format. The Scaled time series are based on the earthquake magnitude (Mw) and Epicentral distance provided.

Request Time Series: Yes ☐ No ☐

Sediment Thickness

The sediment thickness is used by *SCENARIO_PC*, to generate the time series simulation. The time series can be generated with the default sediment thickness as indicated in *2.2.2.1 Site Response Modeling* of the *Seismicity Study Report* (http://www.scdot.org/doing/pdfs/Reporttxt.pdf) or can adjusted specifically for the geology and analysis requirements at the specific project location. This option only applies to those site were the Geologically Realistic Model is used.

Change Sediment Thickness: Yes meters **No ☐**

Match Entire Uniform Spectrum

In cases where the uniform hazard spectrum is dominated by a single scenario (a well defined modal event in the Deaggregation plots), the spectrum of the modal event may closely match that of the uniform hazard spectrum, even without much scaling. This will be the case for sites in the Coastal Plain near Charleston, for the 3% in 75 year hazard level. However, at sites where there are two or maybe 3 modes in the deaggregation, matching the entire spectrum with a single modal event will require much scaling. This scaling can be done automatically over the entire spectrum. Matching the entire spectrum involves a phase-invariant spectral scaling of the scenario time series. It is often preferable to use two or more modal events, each matching a specific frequency of the uniform hazard spectrum. This results in a simple constant (frequency independent) scaling of the scenario time series. If the consultant selects to not match the entire spectrum, the spectrum may be scaled using either an oscillator frequency/PSA or a PGA that will be matched when simulating the ground motion.

Match Entire Spectrum:	**Yes ☐**	**No ☐**		
		Scaling Parameter	**M_{w1}**	**M_{w2}**
If Not matching Entire Spectrum, Select PSA or PGA Scaling	**PSA Scaling ☐**	**Oscillator Frequency**	**Hertz**	**Hertz**
		PSA	**g**	**g**
	PGA Scaling ☐	**PGA**	**g**	**g**

Scenario Earthquake Magnitude and Distance

Determine earthquake magnitude, M_W, and epicentral distance from the deaggregation plots provided by the U.S. Geological Survey (http://eqint.cr.usgs.gov/deaggint/2002/index.php). The 3% and 15% in 75-year events are equivalent to the 2% and 10% in 50-year events, respectively.

M_{W1} =	**Epicentral Distance =**	Kilometers
M_{W2} =	**Epicentral Distance =**	Kilometers

[1]**RPG – Region Production Group**

Lowcountry - Beaufort, Berkeley, Charleston, Colleton, Dorchester, Hampton, Jasper
Pee Dee – Chesterfield, Clarendon, Darlington, Dillon, Florence, Georgetown, Horry, Kershaw, Lee, Marion, Marlboro, Sumter, Williamsburg
Midlands – Aiken, Allendale, Bamberg, Barnwell, Calhoun, Chester, Fairfield, Lancaster, Lexington, Newberry, Orangeburg, Richland, Union, York
Upstate – Abbeville, Anderson, Cherokee, Edgefield, Greenville, Greenwood, Laurens, McCormick, Oconee, Pickens, Saluda, Spartanburg

Consultant Geotechnical Seismic Response

To:	
Consultant:	
Date Requested:	

PROJECT INFORMATION

File No.	**Project No. (PIN):**
County:	**Route:**
Description:	
Latitude (4 decimals): .	**Longitude (4 decimals):** .

Bridge Category / Seismic OC:	
Type of Seismic Information Requested:	
Seismic Site Class:	

Pseudo-Spectral Acceleration (PSA)

The SCDOT Geotechnical Design Section has generated the required Design Earthquake the pseudo-spectral acceleration (PSA) oscillator response for frequencies 0.5, 1.0, 2.0, 3.3, 5.0, 6.7 and 13 Hz, for 5% critical damping and peak horizontal ground acceleration (PGA) at the **B-C Boundary.**

SEE – 3% Probability of Exceedance in 75 years

PSA and PGA as Percentage of g

0.5Hz	1.0Hz	2.0Hz	3.3Hz	5.0Hz	6.7Hz	13.0Hz	PGA

Thickness of sediments: meters

FEE – 15% Probability of Exceedance in 75 years

PSA and PGA as Percentage of g

0.5Hz	1.0Hz	2.0Hz	3.3Hz	5.0Hz	6.7Hz	13.0Hz	PGA

Thickness of sediments: meters

Time Series

Unscaled and Scaled time series were generated for the **B-C Boundary** in Shake91 data format. The Scaled time series are based on the earthquake magnitude (Mw) and Epicentral distance requested.

The Time Series Files are Attached:	**Yes** ☐	**No** ☐

Design Response Spectrum

The SCDOT Seismic Design Specifications for Highway Bridges, latest edition, is used to develop the Design Response Spectrum.

The Design Response Spectrum is Attached:	**Yes** ☐	**No** ☐

Geotechnical Designer:		**RPG[1]:**	
Date:		**Phone Number:**	( ) -
Geotechnical Review:		**RPG[1,2]:**	

[1] **RPG – Region Production Group**

Lowcountry - Beaufort, Berkeley, Charleston, Colleton, Dorchester, Hampton, Jasper

Pee Dee – Chesterfield, Clarendon, Darlington, Dillon, Florence, Georgetown, Horry, Kershaw, Lee, Marion, Marlboro, Sumter, Williamsburg

Midlands – Aiken, Allendale, Bamberg, Barnwell, Calhoun, Chester, Fairfield, Lancaster, Lexington, Newberry, Orangeburg, Richland, Union, York

Upstate – Abbeville, Anderson, Cherokee, Edgefield, Greenville, Greenwood, Laurens, McCormick, Oconee, Pickens, Saluda, Spartanburg

[2] **RPG – PreConstruction Support – Geotechnical Design Section (PCS/GDS)**

South Carolina
Department of Transportation

INTEROFFICE MEMORANDUM

To: Director of Rights-of-Way

From: RPG

Date:

Subject: Access Permission Request

The following project is being prepared for Geotechnical Subsurface Investigation:
County:
Road:
File:
Project No.:
PIN No.:
Location:
Project Name:
Charge Code:
Project Manager:

Project Management has provided us with plans, and we will visit the above referenced site in the coming weeks. Based upon the information provided, we understand the following design concepts are under consideration at this time:

- The proposed bridge will be constructed on the existing horizontal alignment.
- The grade will be raised approximately XX ft above the existing finish grade elevation
- This project will encompass approximately.

Roadway and Bridge borings will need to be performed between Stations XX+XX to XX+XX on Anywhere Road, some of which are on SCDOT Right-of-Way and others that are not. Installation of an accessway will be required for this project. This may entail removal of some trees using heavy equipment to permit access. It may also be necessary for us to bring in fill soil to bridge soft, wet areas. Every effort will be made by the Contractor to minimize damage to property and as few trees as possible will be disturbed in the process. Below is a table of anticipated boring locations for the project site. It must be pointed out that the boring locations are planned and may change if site conditions warrant or utilities such as overhead power lines necessitate relocation of the proposed borings.

Table 1 (Road)

Boring No.	Road Cut (C)/ Road Fill (F)	Proposed Stationing	Offset Distance (ft)*	Boring Depth (ft.)

***Offset from construction centerline, both left and right**

Table 2 (Bridge)

Boring No.	Proposed Stationing	Offset Distance (ft)*

***Offset from construction centerline, both left and right**

South Carolina
Department of Transportation

Attached are the Geotechnical Design Section's Scoping forms (Form GDF 000), one (1) full-sized set and one (1) half-sized set of plans depicting the proposed soil test boring locations for the project. Bridge and roadway soil borings will be required as indicated on the plans.

We anticipate the access permission to be available by Month day, Year so we can begin mobilizing the drillings. Once signed permission has been obtained, please provide a copy of the signed document to us. We will provide a copy of this document to the drillers, who will be required to maintain copies physically in their possession at all times during drilling operations.

If you have any questions or comments, feel free to contact either Jeff Sizemore at (803) 737-1571 or, Sara Stone at (803) 737-1608. Or you can email me at **StoneSM@scdot.org.**

Sara M. Stone	Jeff Sizemore, P.E.
Geotechnical Professional	Geotechnical Design Engineer

JCS/SMS: xxx
cc: BDF, Project Management, Geotech file

South Carolina
Department of Transportation

Date:

To:

Re: File No. , PIN

County

If you have any comments or questions, please contact us.

Your Name
Your Title

cc:

South Carolina
Department of Transportation

Date: March 10, 2005

To: Consultant

From: RPG

Re: Soil Exploration Testing and Compressive Strength Testing of Rock Cores

Soil Exploration and Testing of soil samples and Compressive strength testing of rock core samples is requested for the following project

County:
Road:
Route Local Name:
File:
Project No.:
PIN No.:
Location:
Project Name:
Charge Code:
Priority: ***Lab test information needed April 22, 2005.***
Final Boring Logs needed April 29, 2005.

Boring Number	Sample Depth (ft)	Sample Number	Grain Size with wash #200	Atterberg Limit	Natural Moisture Content
B-1	0 - 2				
	2 – 4				
	4 – 6				
	8 - 10				
	13.5 – 15.0				
	18.5 – 20.0				
	23.5 – 25.0				
	28.5 – 30.0				
	33.5 – 35.0				
	43.5 – 45.0				
B-2	0 – 2				
	2 – 4				
	4 – 6				
	6 – 8				
	8 - 10				
	18.5 – 20.0				
	23.5 – 25.0				
	38.5 – 40.0				
B-3	22.0 – 24.0				
	24.0 – 26.0				
	26.0 – 28.0				
	28.0 – 30.0				
	30.0 – 32.0				
	48.5 – 50.0				

Note: ** Conduct hydrometer analysis also.

Boring Number	Recovery (%)	RQD(%)	Core Number	Number of Breaks Requested
B-2				
B-3				
B-4				
B-5				
B-6				

Please e-mail an electronic copy and forward a hard copy of the results to Sara Stone so that the information can be included in the contract document. If you require any additional information, please contact Sara Stone at 737-1608.

Requested by:

Sara Stone
Geotechnical Professional

cc: BDF, Geotech